RP0902 - INTRODUCTION TO OPERATION PROCEDURES OF M1123

PURPOSE. The purpose of the next period of instruction is to provide you, the operator the knowledge on performing the PMCS required to operate the vehicle, how to safely operate the vehicle, and the controls and accessories and their function. With this class and the remainder of the course you will be officially licensed to operate specific Marine Corps government vehicles.

LEARNING OBJECTIVES.

a. TERMINAL LEARNING OBJECTIVES:

(1) Provided with an operation M series Vehicle and references operate M series vehicle on road to safely meet operational requirements with no injury to personnel or damage to equipment, per student handout. (RP00.09.03)

(2) Provided with an operation M series vehicle, required tools and equipment, and references, perform preventive maintenance checks and services on M series vehicles, to maintain operability and identify corrective maintenance actions, per the references. (RP00.09.12)

b. ENABLING LEARNING OBJECTIVES:

(1) Given a M1123, TM 2320-10/6B and LO 9-2320-280-12, and a Vehicle and Equipment Operational Record (NAVMC 10627), all required tools and supplies, perform "Before Operation" preventive maintenance checks and services (PMCS) on the vehicle, per information contained in the references. (RP00.09.12a)

(2) Given a M1123, TM 2320-10/6B and LO 9-2320-280-12, and a Vehicle and Equipment Operational Record (NAVMC 10627), all required tools and supplies, perform "During Operation" preventive maintenance checks and services (PMCS) on the vehicle, per information contained in the references. (RP00.09.12b)

(3) Given a M1123, TM 2320-10/6B and LO 9-2320-280-12, and a Vehicle and Equipment Operational Record (NAVMC 10627), all required tools and supplies, perform "After Operation" preventive maintenance checks and services (PMCS) on the vehicle, per information contained in the references. (RP00.09.12c)

(4) Given a M1123, TM 2320-10/6B and all Basic Issue Items associated with the vehicle, maintain basic issue item for the M1123, per information contained in the reference. (RP00.09.12g)

GENERAL DESCRIPTION.

a. Characteristics and Features:

(1) The M998/1038 is a high mobility, multipurpose, wheeled vehicle commonly called the "HUMVEE". The M1123 vehicle is a Truck Utility: Heavy Variant.

(2) The M1123 vehicle is a tactical vehicle designed for use over all types of roads, as well as cross country terrain, in all weather conditions. It is a full time four-wheel drive and is powered by a 6.5 liter V8 diesel engine through a four speed automatic transmission and transfer case having three range selections. The older M998/M1038 has a 6.2 liter V-8 diesel engine with a three speed automatic transmission and a three range selection transfer case.

b. Major Systems of the HMMWV:

(1) Engine:

(a) The M1123 is powered by a 6.5 liter V8, diesel engine that develops 160 horsepower at 3,400 rpm.

(b) The M998/M1038 is powered by a 6.2 liter V8, diesel engine that develops 150 horsepower at 3,600 rpm.

(2) Transmission:

(a) M1123 is the GM THM 4L80-E automatic with four forward ranges, one reverse and a park. There is also a transmission warning light positioned in front of the selector lever. This feature will not be found on the older M998/M1038.

(b) M998/M1038 is the GM THM 3L80 automatic with three forward ranges and one reverse. A unique feature of the older M998 series transmission is that the "PARK" position normally found on automatic transmissions had been excluded.

(3) Transfer Case. The transfer case directs power from the transmission to the front and rear differentials simultaneously. This means the vehicle is always in four-wheel drive. The transfer case has a selection of three drive ranges and a neutral position. It also has a built-in differential that supplies equal power to both the front and rear differentials when the transfer case is placed in the "LOW" or "H/L" (High Lock) position.

(4) Differentials. To compliment the features provided by the transfer case, the vehicle is equipped with differentials having a unique feature called torque-biasing. This will be discussed in detail later on in the class.

(5) Wheel Hubs. The wheel hubs are peculiar to this vehicle in they are geared. This serves two distinct purposes:

(a) They act as the final drive component to the front and rear wheels.

(b) They allow more ground clearance for the vehicle.

(6) Power Steering Pump. The power steering pump used on the HMMWV engine is a multipurpose pump.

(a) It pressurizes the hydraulic fluid in the system to provide the vehicle with power steering.

(b) It also provides hydraulic pressure to assist during braking.

(c) The third function it has is to provide hydraulic pressure to allow the radiator fan clutch to operate as a temperature controlled clutch.

(d) It also powers the hydraulic winch if the vehicle is equipped with the hydraulic winch.

(7) Fan Clutch. The radiator fan in the HMMWV normally activates when the engine temperature exceeds 220 degrees Fahrenheit and deactivates when the temperature drops to 190 degrees Fahrenheit.

(a) The fan can also be controlled by a kick-down switch located on the injection pump and activated by the accelerator pedal.

(b) To disengage the fan and stop it from turning, you would quickly depress the accelerator pedal and let it up in one movement. This will allow a twenty second delay in the fan operation.

(c) This kick down switch would be used just before entering water puddles, crossing streams, or fording the vehicle to keep the fan from being broken if it is submerged.

(d) Another time the kick-down switch would be used is when approaching a short steep hill and maximum horsepower was needed when carrying or pulling a load. It takes engine power to drive the fan; so being able to disengage the fan when maximum power is required is a good feature.

c. Models. There are numerous variations or models of vehicles in the M998 series. The major variations of the vehicle are in body configurations and purpose of the vehicle.

d. New Model - M1123. The new model being produced is called the Heavy Variant, Cargo Troop Carrier, M1123. This vehicle is capable of transporting 4400

pounds of cargo as compared with the 2500 pound capacity of the M998. The major changes included:

(1) Frame and cross members are reinforced.
(2) Heavy duty lifting shackles, springs, and shock absorbers.
(3) Larger and stronger tires and wheels are installed.
(4) A larger engine with more horse power.
(5) A newer transmission with four speeds and a park position.
(6) A new transfer case and differentials with a modified gear ratio are used to give the M1123 the extra pulling power for the additional weight it carries.
(7) The body style remains the same as the M998 variant.

e. Purpose: The M1123 is used to transport equipment, materials and/or personnel. The cargo carrier is capable of transporting a payload of 4400 pounds, including the crew. The troop carrier is capable of transporting a two-man crew and eight passengers. It also has a four-man crew configuration. Both vehicles use a troop seat kit for troop transport operations.

f. Performance:

(1) Fully loaded, the M1123 will climb road grades as steep as 60% (31 degrees) and traverse or go around a side slope of up to 40% (22 degrees).
(2) The vehicle can ford hard bottom water crossings of 30 inches without a deep water fording kit and 60 inches with the kit. Incidentally, all Marine Corps M998 series vehicles come equipped with a deep water fording kit.
(3) The cruising range of the M1123 is 275 miles and the M998/M1038 is 337 miles when driven on hard surface and hilly terrain at 30-40 miles per hour.

g. Variations: The information contained in this lesson is common to all models of the M998 series. However, we will concentrate on the M1123, M998 and M1038 only. The only difference between M998 and the M1038 is the M1038 is equipped with a front mounted electric powered winch with a 6000 pound capacity; the M998 has no winch.

h. Dashboard Instruments and Controls: In the operator's manuals and during this class the term "left" indicates the driver side of the vehicle and the term "right" indicates the passenger side of the vehicle.

(1) Ignition Switch:

(a) The ignition switch, called the rotary switch, is located on the left side of the dash and is a three-position rotary switch. These positions are marked "ENG STOP," "RUN" and "START."

(2) Wait to Start Lamp: The "WAIT TO START" lamp is the amber lamp located directly above the ignition switch. This lamp illuminates when the ignition switch is first turned to the "RUN" position.

(a) The engine is equipped with glow plugs in each cylinder that warm the air in the cylinder for starting.

(b) While the wait to start lamp is on, the glow plugs are receiving a electrical charge for about 9 seconds to get them hot.

(c) After their initial warm up, they will continue to receive one second afterglow cycles to keep them hot.

(d) There are four steps in the starting sequence to protect the glow plugs.

1 First, turn the ignition switch to the "RUN" position and wait for the lamp to go out. Remember, the lamp will remain on until the glow plugs warm up for about 9 seconds.

2 Turn the ignition switch to the "START" position. Don't hold the switch in "START" position for more than 20 seconds. The starter will overheat and burn out.

3 If the engine does not start, return the ignition switch to the "RUN" position and wait 10 to 15 seconds to allow the starter to cool.

4 If you turn the ignition switch to the "ENG STOP" position, you must wait 90 seconds before attempting to start the engine again. If you don't wait, the glow plug controller will reactivate the glow plugs thinking this is a new start and give the plugs a new pre-glow cycle. Since the glow plugs are already hot, they'll get hotter and burn out.

5 Remember, never attempt to start the engine while the wait to start lamp is on. This will burn out the glow plugs.

(3) Brake Warning Lamp: For safety, the vehicle has a brake warning lamp that illuminates when the parking brake is applied or when there is a malfunction in the brake system, such as a fluid leak and will illuminate.

(4) Air Restriction Gage: This gage is located on the instrument panel to the right of the rotary switch and directly below the brake warning lamp.

(a) This gage signals the operator when the air filter in the air cleaner is getting dirty and is restricting the flow of air to the engine.

(b) The air filter must be cleaned or replaced when the yellow air restriction indicator reaches the "RED ZONE" of the gage.

(5) Engine Oil Pressure Gage: This gage is the upper left gage of the instrument cluster and indicates the engine oil pressure when the engine is running. The gage should display 10 psi for the M1123 and 15 psi for the M998/M1038, when the engine is running at an idle. The pressure should display 40 to 50 psi when the vehicle is in operation. If the oil pressure drops to six psi or less shut the engine off or damage may result to the engine.

(6) High Beam Indicator: This indicator is in the upper center of the instrument cluster; it illuminates when the headlights are switched to the high beam position.

(7) Coolant Temperature Gage: The coolant temperature gage displays the temperature of the engine coolant and should be between 190 degrees Fahrenheit to 230 degrees Fahrenheit during normal operations.

(8) Defroster Control Knob: The defroster control knob is the upper control knob to the right of the instrument cluster; it controls the operation of the defroster.

(9) Instrument Panel Lights: The instrument panel is illuminated by two lights in the instrument cluster, one on each side of the speedometer. These lights have a dim and a bright setting that is controlled by the master light switch.

(10) Heater Control Knob: The heater control knob is located to the right of the instrument cluster, directly below the defroster control knob; it is used to vary the temperature of the heated air when you are operating the heater.

(11) Heater Fan Switch: The blower motor is controlled by the heater fan switch. The switch has three settings, "HI," "OFF," and "LO," to regulate the heater and defroster air flow.

(12) Voltmeter: The voltmeter is the lower, right gage in the instrument cluster and indicates the charging level and activity of the battery charging system. It should register in the green area.

(13) Speedometer/Odometer: Like most vehicles, the vehicle has a speedometer/odometer to register speed in miles per hour and accumulated mileage.

(14) Fuel Gage: The fuel gage indicates the amount of fuel in the tank.

(15) Hand Throttle: The hand throttle is located on the right below the instrument cluster and is provided to increase engine speed for use during cold weather starting, winch operation, deep water fording and to obtain maximum alternator output for communications and electrical requirements. The hand throttle is not to be used as an automatic speed or cruise control. It does not automatically disengage when the brake is applied; therefore, increased stopping distances and unsafe operation result if the hand throttle is improperly used.

(16) Accelerator Pedal: The accelerator pedal normally called the "gas" pedal, allows you to control the engine speed with your foot.

(17) Service Brake Pedal: The service brake pedal is used to slow or stop the vehicle by depressing the pedal.

(18) Dimmer Switch: The dimmer switch is located in the upper left hand corner of the driver side floor board and is depressed with the foot to select high or low headlight beam.

(19) Directional signal/emergency flasher indicator light: Illuminates during directional signal or emergency flasher use. For the M1123 this will automatically turn off once the turn is complete but, on the M998/M1038 it will have to manually be turned off by hand.

(20) Light Switch: The light switch is located on the left side of the dash directly below the ignition switch and is the one control that is entirely different from the ones in civilian cars. This switch controls the service lights, parking lights, turn signals, blackout lights and the horn.

(a) The switch has three control levers.

1 The selector lever is at the top center of the switch and is used to select either service or blackout lights.

2 The unlock lever on the bottom right is a lock release switch for the selector lever.

3 The auxiliary lever is on the bottom left of the switch and controls the instrument panel and parking lights.

(b) For normal daylight driving:

1 Lift the unlock lever to "UNLOCK" and hold it in position.

2 Turn the selector switch to "STOPLIGHT."

3 This will allow operation of the stoplights, the turn signals and the horn.

(c) For night driving:

1 Lift the unlock lever to "UNLOCK" and hold it in position.

2 Turn the selector lever to "SERVICE DRIVE."

3 This will allow operation of the service drive lights, the stoplights and the horn.

4 Use the dimmer switch for high or low beam selection.

(d) For blackout operations:

1 Turn the selector lever to "B.O. MARKER" or "B.O. DRIVE" as desired.

2 The unlock lever must be moved to "UNLOCK" before the selector lever can be moved to "B.O. DRIVE."

3 The horn will not operate when the blackout lights are in operation.

(e) To illuminate the instrument panel:

1 Lift the "UNLOCK" lever and hold it in position.
2 Turn the selector lever to any "ON" position except "B.O. Marker."
3 Turn the auxiliary lever to "DIM" or "PANEL BRT" for brightness desired.

(f) To activate parking lights:

1 Turn the selector lever to "SERVICE DRIVE."
2 Turn the auxiliary lever to "PARK."

i. Operator Cab Controls:

(1) Directional Signal Lever: For operation of the directional signal indicator, the light switch must be turned to either "STOPLIGHT" or "SERVICE DRIVE."

(a) For left turn indicator, pull down on the directional signal lever.
(b) For right turn indicator, push upward on the directional signal lever.

(2) Hazard Warning Control: Another control is for the hazard warning or emergency flasher lights.

(a) Turn the light switch selector to "STOPLIGHT" or "SERVICE DRIVE."
(b) Pull the warning hazard tab out and move the turn signal indicator lever up to lock the lever in place.
(c) To deactivate the signals, move the turn signal lever back to neutral.
(d) The warning flashers override the brake lights. This means when the warning flashers are operating and the brake pedal is depressed the brake lights will not operate.

(3) Horn Button: The horn button is located in the center of the steering wheel and is depressed to activate the horn. Remember the light switch must be on "STOPLIGHT" or "SERVICE DRIVE" before the horn will operate.

(4) Baffle Operating Rods M998/M1038 ONLY: Over on the top right side of the dash are two baffle operating rods. These open and close the baffles and slide open to allow heated air into the crew compartment. This is not found on the M1123.

(5) Transmission Shift Lever. The transmission shift lever is located on the driver's right in the center console and works very similar to the ones in civilian cars. There is a transmission warning light located in front of the shift lever on the M1123 and

on the M998/M1038 there is not a warning light. The transmission shift lever can be shifted to these positions:

(a) M1123:

1 “P” (Park). Park is used when the vehicle is parked with the parking brake applied and when checking the transmission fluid level.

2 "N" (Neutral). Neutral is used when the vehicle is stopped with parking brake applied or when towing or winching the vehicle.

3 "R" (Reverse). Reverse is used to move the vehicle backwards. The button on top of the shift lever must be pressed to shift the transmission to reverse. This helps prevent accidental shifting into "REVERSE" when the vehicle is in motion.

4 "(D)" (Overdrive). The overdrive position is selected for normal driving and for fording.

5 “D” (Drive). Drive is used for hilly terrain and towing a trailer.

6 "2" (Second). Second gear selection is used for hill climbing and for engine braking to slow the vehicle when descending steep hills.

7 "1" (First). First gear is used for maximum engine braking when descending very steep hills, for climbing steep hills or when driving through deep mud, sand or snow.

8 Proper transmission range selection is made in conjunction with transfer case range selection.

(b) M998/M1038:

1 "N" (Neutral). The transmission shift lever must be in "NEUTRAL" to start the vehicle's engine and it is used when the vehicle is parked. The M998 series vehicles do not have a "Park" position so the parking brake must be applied when the vehicle is parked in "NEUTRAL."

2 "R" (Reverse). Reverse is used to move the vehicle backwards. The button on top of the shift lever must be pressed to shift the transmission to reverse. This helps prevent accidental shifting into "REVERSE" when the vehicle is in motion.

3 "D" (Drive). The drive position is selected for normal driving and for fording.

4 "2" (Second). Second gear selection is used for hill climbing and for engine braking to slow the vehicle when descending steep hills.

5 "1" (First). First gear is used for maximum engine braking when descending very steep hills, for climbing steep hills or when driving through deep mud, sand or snow.

6 Proper transmission range selection is made in conjunction with transfer case range selection.

(6) Transfer Case Shift Lever: The transfer shift lever is located to the left of the transmission shift lever. This shift lever is used to select the transfer case driving range. The ranges and their purposes are:

(a) "H" (High Range). This drive range must be used when operating on all primary, secondary, and off-road surfaces where little or no wheel slippage occurs. This range is also to be used when encountering sharp, continuous turns on high traction surfaces.

(b) "H/L" (High Lock Range). This drive range will be selected only when continuous wheel slippage is evident, especially when operating in mud, snow, loose sand, or on ice, and increased control or additional traction is required.

(c) "L" (Low Range). This drive range is used when high ranges do not provide sufficient power to negotiate steep hills or engine braking on down grades. This range shall also be used when the vehicle is mired and cannot be freed using the high lock range.

(d) "N" (Neutral). This selection will be used when the vehicle is disabled and must be towed or winched.

(e) The vehicle must be stopped and the transmission in "N" neutral before shifting the transfer.

(7) Parking Brake Lever:

(a) The M1123 is equipped with a mechanical parking brake that manually activates the rear service brakes. The parking brake lever is located immediately to the right of the operator's seat. The brake lever is pulled up to apply the brake and pushed down to release it. For the new parking brake lever the safety release button must be depressed.

(b) The M998/M1038 vehicle is equipped with a mechanical parking brake that works independently of the service brakes. The parking brake lever is located immediately to the right of the operator's seat. The brake lever is pulled up to apply the brake and pushed down to release it. For the new parking brake lever the safety release button will have to be depressed to lower the brake lever.

(8) Fording Control Switch: The fording control switch is located directly below the instrument panel. This switch allows the driver to select "VENT" during normal driving and "DEEP FORD" for deep water fording. This pressurizes the engine to keep water out of the system.

(9) Steering Wheel Lock Cable: The vehicle is equipped with a steering wheel lock cable located to the immediate left of the hand throttle. This cable permits the steering wheel to be locked to prevent unauthorized use of the vehicle.

(10) Windshield Washer/Wiper Control Knob: The windshield washer/wiper control knob is located on the wiper motor at the center top of the windshield. The wiper is turned on by rotating the knob clockwise to the "LO" or "HI" position for the desired

wiper speed. The washer is activated by turning on the wipers and depressing the control knob.

(11) Vehicle Batteries: The vehicle batteries are located in the battery box under the passenger seat. The two batteries provide 24/12 volt power to the vehicle's electrical system.

(12) First Aid Kit Bracket and Strap: The first aid kit bracket and strap are located inside the battery box and are used to secure a first aid kit, which is part of the BII inventory.

(13) Slave Receptacle: The slave receptacle is located at the outside front of the battery box and is the connecting point for a NATO slave adapter used for slave-starting the vehicle.

(14) Engine Access Cover: The engine access cover is located at the center front of the console and is removed to provide access to the rear of the engine.

(15) Fire Extinguisher Bracket. The fire extinguisher, which is also a BII component, is stowed in the fire extinguisher bracket that is located at the left side of the driver's seat for the M1123 model and in front of the driver's seat for the M998/M1038 model.

(16) Driver's Seat:

(a) M998/M1038. The driver's seat is adjusted by means of adjusting slots located below the seat which permit the seat to be locked in a forward, center or rearward position.

(b) M1123. The driver's seat is adjusted by means of an adjusting lever located at the front of the seat which permits the seat to be locked in a forward, rearward, and a vertical position.

j. Exterior Components:

(1) Cargo Tie downs: There are eight cargo tie downs located in the cargo area of the vehicle that provide tie down points for use in cargo operations.

(2) Tailgate, Tailgate Chains and Hooks: The tailgate is located at the rear of the vehicle and opens and closes to allow access to the vehicle cargo area. The tailgate chains and hooks are located on either side of the tailgate and are used to secure the tailgate to the rear of the vehicle body.

(3) Lifting Shackles: A feature that is common to tactical vehicles is the lifting shackles. These are located on both ends of the vehicle and are used for slinging the vehicle when it is being loaded aboard ship; they are also used as tie down points when securing the vehicle aboard ship.

(4) Trailer Receptacle: The trailer electrical receptacle is another common feature of tactical vehicles. The vehicles are wired in such a manner that the lights on any towed trailer will operate correctly in conjunction with the vehicle pulling them by connecting the trailer electrical cable to the vehicle's electrical receptacle.

(5) Towing Pintle: The towing pintle is located at the center rear of the vehicle and provides a connection point for towing equipment such as trailers. This also is a common feature of tactical vehicles.

(6) Fuel Tank Filler Cap: The fuel tank filler cap is located at the right rear side of the vehicle and is removed to permit fuel servicing.

k. Engine Compartment Components

(1) Hood. The hood on this vehicle is heavy and requires a little bit of caution when raising and lowering it. Unlike the hood on your car, you are required to raise and lower this hood twice every time you operate the vehicle; once for the "Before Operation" checks and once for the "After Operation" checks. To raise the hood:

(a) Apply the parking brake.

(b) Release the left and right hood latches by pulling down on the latches.

(c) To ensure opening of the hood is accomplished safely and effectively, always maintain the proper lifting posture, legs bent and back straight.

(d) Due to the weight of the hood, it may flex when opening it, causing interference between the right side of the hood and the body. You can eliminate this by pushing the hood laterally away from you prior to lifting.

(e) Facing the driver's side of the hood, position the right hand at the bottom rear area of the hood and the left hand at the rear area of the wheel well.

(f) Lift to open the hood, ensuring the hood prop rod is securely positioned in the hood support bracket. The prop rod should automatically engage the support bracket when the hood is raised. Injury to you or damage to equipment may occur if the hood is not properly secured in the raised position.

(2) Lowering hood. Caution also must be used to lower the hood.

(a) While supporting and slightly raising the hood, grasp the prop rod above the retaining ring and pull out.

(b) Do not pull the rod at the hook as injury to your fingers may occur.

(c) Once the prop rod hook is clear of the support bracket, slowly lower the hood and secure the hood latches.

(3) Power Steering Reservoir. The power steering reservoir is located on the left front of the engine. It is mounted between the engine and alternator, tucked up under the alternator mounting bracket.

(a) The cap on the power steering reservoir has a vent line running to the fording valve inside of the cab. This rubber vent line must be attached to the cap at all times while the vehicle is in operation, especially during fording.

(b) The dipstick on the inside of the cap has "ADD", "COLD", and "HOT" marks for the fluid levels. Never operate the vehicle if the fluid level is below the "ADD" mark and never overfill the reservoir, damage to the power steering system will result. The fluid used in the power steering system is Dexron III.

(4) Engine Oil Dipstick. The engine oil dipstick is located on the left side of the engine to the rear of the power steering reservoir. The "T" handle must be turned counterclockwise to loosen and removed to check the engine oil level. The engine oil that must be used is OE/HDO-15W 40. Do not over tighten the dipstick after checking the oil.

(5) Oil Filler Cap. The oil filler cap is located at the front center of the engine and is removed by turning counterclockwise to replenish engine oil.

(6) Brake Master Cylinder. The brake master cylinder is located on the left side, inside the fender well on the engine fire wall. The fluid level is checked by moving the bail wire on top of the cap toward the engine. The fluid used is **Dot 5** brake fluid and the level should be 1/8 inch from the top. The older M998/1038 uses Brake Fluid Silicone (BFS).

(7) Fan Clutch Override. The fan clutch override is located just inside the windshield washer reservoir. If engine overheating occurs because the fan is not activating to cool the engine, unplug the two wire connector between the time delay module and the fan control valve. The fan will come on and stay on to cool the engine.

(8) Fuel Filter Draincock. The fuel filter draincock is located on the front of the engine firewall directly below the windshield washer reservoir. The procedures for draining the fuel filter will be covered in detail during the preventive maintenance portion of the lesson.

(9) Windshield Washer Reservoir. The windshield washer reservoir is the square plastic bottle located at the left rear of the engine compartment; it should be kept full of washer fluid.

(10) Fuel Filter. The fuel filter is located on the left center of the engine fire wall. Servicing of the fuel filter will also be covered in detail during the preventive maintenance portion of this lesson.

(11) Air Cleaner. The air cleaner is located on the right rear portion of the fender well; it contains the air filter. Servicing of the air cleaner is normally not the operator's responsibility but it is authorized under emergency situations in order to complete your mission and return the vehicle to the motor pool. Servicing of the air cleaner will be covered during the preventive maintenance portion of this lesson.

(12) Coolant Surge Tank. The coolant surge tank is located directly behind the air cleaner. The surge tank is pressurized and for that reason, the cap should not be removed while the engine is hot or immediately after the engine has been shut down.

(13) Transmission Oil Dipstick. The transmission oil dipstick is located at the right rear of the engine next to the coolant surge tank. The dipstick also has a "T" handle that is turned counter-clockwise to loosen for removal to check the level of fluid. The fluid for the transmission is Dexron III.

(14) Radiator Draincock. The radiator draincock is located on the bottom right radiator hose pipe between the engine and radiator. Normally, an operator will not drain the radiator unless they are assisting a mechanic servicing or winterizing the cooling system.

MAINTAIN AND STOW THE BASIC ISSUE ITEMS

a. The BII for these vehicles are listed in Appendix B of the technical manual. They are arranged alphabetically and by usable on codes. Turn to Appendix B and see how to use this appendix.

b. Scope. This appendix lists the basic issue items for M998 series vehicles. The appendix is designed to help inventory the items that are required for safe and efficient operation of the vehicle. These are the minimum essential items required to operate the M998 series vehicles and to perform emergency repairs. All BII must be with the vehicle during operation.

c. Explanation of Columns. The BII are divided into five columns with pictures of the individual items provided below the columns.

(1) Column 1. The first column provides illustration numbers that are keyed to the illustrations.

(2) Column 2. The second column provides the national stock number assigned to each item. These stock numbers will be used when ordering replacements when an item is lost or becomes unserviceable.

(3) Column 3. The third column gives the item name, the Federal Supply Classification Manufacturer's (FSCM) numbers and the location where the item is meant to be stowed. This column also includes the Usable on Codes. The Usable on Codes assigned to each BII tells you which vehicles in the M998 series the item is used with. Notice that several BII have no Usable on Code listed; this means these BII items are common to all M998 series vehicles.

(4) Column 4. The fourth column indicates the unit of issue.

(5) Column 5. The last column gives the quantity authorized/required to be used with or on the vehicle.

d. Basic Road Gear

(1) There are several items that are part of the Basic Road Gear that are carried in the vehicle during operation.

(a) Triangles:

Used if a break down occurs to warn other drivers of the disabled vehicle on the side of the road. Place two triangles behind the disabled vehicle to warn traffic of the disabled vehicle ahead. One triangle will be placed about 10 feet behind the vehicle and the other triangle will be about 100 feet behind the vehicle. If traffic is obstructed by a curve or hill from behind the disabled vehicle, then place the second triangle 200 feet to the rear of the vehicle. The third triangle should be placed 10 feet in front of the vehicle to warn on-coming traffic of the disabled vehicle.

(b) Fire Extinguisher:

Used incase of a fire to the interior or exterior of the vehicle.

(c) First Aid Kit:

Used incase of an accident for basic first aid.

(d) Troop Strap

Used at all times when transporting troops or cargo. This will prevent any passengers from falling out of the back and will keep your load from sliding out. Never let passengers use as a foot rest and always keep all legs and arms behind the troop strap.

e. M1123 BII and Storage Locations.

The usable on code for the M1123 is BLANK. You will therefore be required to have all the items listed with no usable on code and all the items with a H13 code.

(1) The first item listed with no code is the 4 pound, single bit ax. The ax is stowed in a tool tray mounted under the rear end of the vehicle.

(2) The next item is the pamphlet bag. The pamphlet bag is used to stow the operator's technical manual (TM-10) and lubrication order (LO) and is stowed under the driver's seat.

(3) The third item listed is the tool bag, which is provided to stow all of the operator's hand tools.

(4) The next item is a 5 pound fire extinguisher with mounting bracket. The fire extinguisher and bracket are mounted in front of the driver's seat.

(5) The fifth item listed is the first aid kit. The first aid kit is stowed inside the battery compartment under the passenger's seat and is held in place with a strap.

(6) The next item listed without a usable on code is an equipment record folder. This item is not normally stocked for Marine Corps vehicles; however, individual units may require it be used.

(7) The folding type jack handle is the next BII and it is stowed under the operator's seat.

(8) The next item is the 36 inch mattock pick handle which is stowed in the tool tray under the rear of the vehicle.

(9) The mechanical or folding 2-ton scissors jack is the next BII. Notice the usable on code says for all vehicles except the HVY (Heavy) variant of the M998 series vehicles. Remember the M1123 is a heavy variant vehicle, so you will need to use the 3 ½-ton scissors jack. This jack has a stud on the top of the jack. If the M998 series jack is used on the M1123 the jack will fail and cause damage to the vehicle and or personnel.

(10) The Mattock pick head is the next BII and is also stowed in the tool tray under the rear of the vehicle.

(11) The next items are the hand tools which are stowed in the tool bag under the driver's seat. The authorized hand tools are:

(a) one combination slip joint pliers with cutters
(b) one cross tip, Phillips type screwdriver, 7 1/2 inches long
(c) one standard flat tip screwdriver
(d) one adjustable (crescent) wrench, 8 inches long

(12) The last BII listed is the wheel lug wrench. It is stowed under the driver's seat.

<u>"DAILY" PREVENTIVE MAINTENANCE CHECKS AND SERVICES:</u>

The following checks and services will be performed before operating any vehicle each time the vehicle is dispatched. You as the operator are responsible for performing each of the checks and services.

a. <u>Instructions for Performing Preventive Maintenance Checks and Services</u>

(1) Turn to page 2-60 in the Technical Manual and you will find the PMCS portion of Chapter 2.

(2) The "Before Operation" PMCS are the listed checks and services that must be performed each day before operating this vehicle.

(3) The "During Operation" PMCS must be performed while operating the vehicle.

(4) The "After Operation" PMCS are the checks and services that must be performed when finished with the vehicle or at the end of the day.

(5) The "Weekly" PMCS are a list of additional checks and services that are not necessary on a daily basis, but must be completed once a week.

(6) The "Monthly" PMCS are a list of additional checks and services that must be completed once a month.

(7) Fluid Leakage. Wetness around seals, gaskets, fittings, or connections indicates leakage. If a fitting or connection is loose, tighten it or report it. Fluid leaks are classified three ways. They are:

(a) Class I. Leakage is indicated by wetness or discoloration not great enough to form drops.

(b) Class II. Leakage is great enough to form drops, but not enough to cause drops to drip from the item being checked or inspected.

(c) Class III. Leakage is great enough to form drops that drip from the item.

(d) The vehicle can be operated with Class I or II leaks except for leaks in the brake system. If there is evidence of any brake fluid leaks, the vehicle will not be used and you must report it to your supervisor and turn in to unit maintenance.

b. Table 2-1 PMCS Listing:

Table 2-1 is used for M998 Series Vehicles. Table 2-1 is divided into five columns to guide you in the performance of your PMCS. The columns are:

(1) Item No. The PMCS are numbered in the sequence they are to be performed.

(2) Interval. The second column, or interval, explains when the particular PMCS must be performed. These PMCS are also listed in the sequence they are to be performed.

(3) Location/item to check/service. The third column describes the location and item that must be checked.

(4) Crewmember procedure. The forth column tells the procedure for checking or inspecting an item. This column also lists notes, warnings, and cautions about the item to be inspected. Remember, always pay particular attention to all warnings and cautions to avoid damage to the vehicle and injury to personnel.

(5) Not fully mission capable. The last column explains when the vehicle is not mission-capable if a certain condition exists such as a class III leak or missing or unserviceable tires. If during the PMCS a problem with the vehicle is discovered that makes it not mission capable, the vehicle must not be used until it has been repaired. Additional PMCS will be listed for specific models in the M998 series. The instructions for the different models will be listed in the crewmember procedures column.

c. "Before" Operation PMCS

(1) The PMCS table in the operator's manual will serve as a guide to explain what PMCS to be performed. The preventive maintenance checklist will be used to annotate the PMCS performed and to note any discrepancies that cannot be corrected by the operator.

(2) If you are the assigned operator of the vehicle but have not operated the vehicle since the last "Weekly" PMCS was performed, or if you are operating the vehicle for the first time, you would perform a "Weekly" PMCS as well as the "Before Operation" PMCS.

(3) Damage, pilferage. Visually check for obvious damage to the vehicle's body and components for anything that might impair operation of the vehicle. If the vehicle is damaged before you operate it, you don't want to receive the blame, so be sure to check the vehicle closely. Note all the discrepancies found and if it is something major, notify your supervisor.

(4) Leaks. Look under the vehicle for evidence of fluid leakage such as fuel, oil, coolant and brake fluid. If there is a brake fluid leak, a fuel leak or a Class III leakage of oil or coolant, do not operate the vehicle. Report them to unit maintenance.

(5) Tires. Visually check for under-inflated and unserviceable tires. Check the tires for leaks, cuts, gouges, cracks or bulges. Remove all penetrating objects.

(6) Mirrors. Check for missing, cracked or broken or fogged glass. Check adjustment bolts and tighten if necessary.

(7) Fuel. Check the vehicle for fuel to ensure there is enough to complete the trip. This can be done by turning on the ignition switch and watching movement of the fuel gage.

(8) Oil. After raising the hood, check the engine oil level. The oil dipstick is located on the left side of the engine to the rear of the alternator. To remove the oil dipstick first loosen the dip stick by turning the "T" handle counterclockwise before pulling it out.

(a) First, check the engine oil before starting the engine to determine if there is sufficient oil.

(b) It is not unusual for the oil level to show overfull at this time. This is caused by the oil in the oil cooler, which is mounted on top of the radiator, draining back down into the engine.

(c) After checking the oil in this manner, replace the oil dipstick, start the engine and let it idle for one minute. Shut the engine off, wait one minute and then check the oil level again. The oil level should be between the "FULL" and "ADD 1 QT" mark on the dipstick.

(d) If the engine oil is low, remove the filler cap, which is located at the front of the engine, and add OE/HDO 15W-40 oil as required. Do not overfill as this could damage the engine, especially the seals.

(e) Replace the filler cap, tighten securely and wipe away any excess oil.

(f) Be careful and do not allow dirt, dust or grit to enter the dipstick tube or filler opening. Engine damage may result if the oil becomes contaminated.

(9) Water. Check the coolant level in the surge tank located at the right rear of the engine.

(a) Visually check the coolant in the surge tank. The level should be at the "COLD FILL LINE" before operation and slightly above the "COLD FILL LINE" after operation.

(b) If the coolant level is low, remove the surge tank filler cap by turning it counterclockwise and add coolant until the level is at the "COLD FILL LINE."

1 Extreme care should be taken if the engine temperature is above 165 degrees Fahrenheit. Do not add coolant to a hot engine unless it is running, and then add it slowly as steam or hot coolant under pressure could cause injury.

2 If the engine is hot, place a thick cloth over the surge tank filler cap and turn the cap counterclockwise to its first stop to allow the pressure to escape.

3 After the pressure is vented, push down and turn the cap counterclockwise to remove the cap. Add coolant until the level is at the "COLD FILL LINE."

(c) Start the engine and run it for one minute.

(d) Stop the engine and recheck the coolant level. If it's low, add coolant until the level is at the "COLD FILL LINE."

(e) Repeat this procedure until the coolant level remains at the "COLD FILL LINE."

(f) The coolant is a combination of water and ethylene glycol. The specific mixture of the two fluids will vary in accordance with expected temperatures.

1 For temperatures above +15 degrees Fahrenheit use a mixture of 1/4 ethylene glycol and 3/4 water.

2 For temperatures in the range of +40 degrees Fahrenheit to -15 degrees Fahrenheit, use a mixture of 2/5 ethylene glycol and 3/5 water.

3 For temperatures in the range of +40 degrees Fahrenheit to -65 degrees Fahrenheit, use a mixture of 3/5 ethylene glycol and 2/5 water.

(10) Engine warm-up. To make proper instrument checks and for smooth operation, the vehicle should be warmed up to operating temperature before attempting to move it. Remember the steps for starting the engine.

(a) Turn the rotary switch to "RUN" and wait for the wait-to-start lamp to go out.

(b) Turn the switch to "START" and release it once the engine has started.

(c) Allow the vehicle to idle until it reaches approximately 190 degrees Fahrenheit, when the thermostat starts to open.

(11) Instruments. While the engine is warming up check the instrument gages to ensure they are working properly and the instrument readings shown are within the normal operating range for that vehicle.

(a) The oil pressure gage should register ten psi for the M1123 and fifteen psi for the M998/1038 with the engine at idle. At no time should the oil pressure register below 6 psi. If it does, shut down the engine immediately.

(b) The coolant temperature gage should register between 190 degrees Fahrenheit and 230 degrees Fahrenheit for normal operating temperature.

(c) The voltmeter should register in the green.

(d) The fuel gage should register the correct amount of fuel in the tank.

(e) The yellow indicator in the air restriction gage should not register in the red zone.

(f) The parking brake warning light should be on because the parking brake should be applied at this time.

(12) Safety devices. Before going on the road inspect the safety devices which include such things as:

(a) lights and reflectors
(b) horn
(c) windshield wipers and washer
(d) parking brake
(e) fire extinguisher
(f) troop safety strap
(g) basic issue items
(h) first aid kit

(13) Tools and equipment. The tools and equipment would be such things as a jack, wheel wrench and operator's tool bag. Your unit motor transport officer will dictate which items of equipment are maintained on each vehicle.

d. "During" Operation PMCS.

The next PMCS we want to perform is the "During" Operation PMCS. This portion of the "Daily" PMCS is a continuous observation from the time the vehicle is started until the last time it is shut down in the evening or whenever returned to the motor pool.

(1) Brakes. Ensure to check the brakes before needing them. Just depress the brake pedal, place the transfer case and transmission in gear, depress the accelerator pedal slightly and see if the vehicle moves or if the brake pedal goes to the floor. When driving and bring the vehicle to a stop, check for pulling, grabbing or abnormal operation.

(2) Parking Brake.

(a) To check the parking brake for proper adjustment, chock the wheels and release the parking brake handle.

(b) Turn the adjustment knob on the end of the handle clockwise as tight as possible.

(c) Apply the parking brake handle.

(d) If the parking brake cannot be applied, turn the adjusting knob counterclockwise until the parking brake can be applied.

(e) Test the parking brake by;

1 Removing the chock blocks.
2 Depress the service brake pedal and start the engine.

3 Place the transfer case shift lever in "H" (high) and shift the transmission to "D" (drive).

4 Slowly let up on the service brake pedal. The parking brake should hold the vehicle stationary at an idle.

(f) The school is changing one major step in this sequence.

1 Instead of turning the adjustment knob clockwise as tight as possible by hand, turn the adjustment knob two turns clockwise.

2 Apply the parking brake and test to see if it holds the vehicle at an idle.

3 If needed, continue to turn the adjustment knob two turns at a time until the parking brake holds the vehicle stationary at an idle.

4 Do not over tighten the parking brake because the brake pads will remain snug against the brake rotor after the handle is released, causing friction, heat buildup and eventual burning of the brake pads and rotors.

(g) After operating in mud or sand, it is important to wash the parking brake components. Use a low pressure water source to make sure that the parking brake pads, rotor, guide pins, and push pins are thoroughly cleaned of mud, sand or other debris. Lubricate the guide pins and push pins to keep them from corroding and sticking.

(3) Steering. While driving the vehicle, pay particular attention to how the vehicle steers. Does the vehicle "wander" or "drift"? Does it pull to the left or to the right? Does it seem too loose or does it seem too tight?

(4) Engine Operation. Observe the engine performance during both an idle and while under a load. Does it start easily, run smoothly and stop immediately when the ignition switch is turned off?

(5) Shock absorbers. While driving, observe any unusual dip, sway or unstable handling that may indicate worn out shock absorbers.

(6) Seat belts. When using the seat belt, check it for proper operation of the buckle and clasp ends. Ensure the mechanism is secure, free of paint and is in the locked position.

(7) Transmission. Check for stiffness or binding in the shift lever by applying the service brake and shifting the transmission through all the operating ranges.

(8) Transfer case. To check the transfer case, apply the service brake and shift the transmission to "N" (neutral). Shift the transfer case through all the operating ranges and check for stiffness or binding in the shift lever.

(9) Exhaust system. While operating the vehicle, listen for exhaust system leaks and be alert for the odor of exhaust gases.

(10) Drive line components. Be alert for unusual noises or vibrations from the transmission, transfer case, differentials, propeller shafts, axle shafts, geared hubs or wheels, these can signal problems.

(11) Unusual noises. Listen for unusual noises anytime the engine is running. You will get acquainted with the sound of the vehicle and should be able to immediately recognize any unusual sound(s).

(12) Windshield and windows. Check the windshield for cracks and serviceability. Check the condition of weather seals and stripping. Check the windows for cracks or tears. Check the zipper operation for proper closure during bad weather.

(13) Windshield wiper arms and blade. Check to see that the wiper arms are secure and not bent. Ensure the wiper arms hold the wiper blade snug against the windshield. Check the wiper blade to see that the rubber is not frayed, cracked or dry rotted.

e. "After" Operation PMCS. The last phase of the "Daily" PMCS is the "After" Operation PMCS. This is performed after completing the run and being secured from the run and returned to the motor pool.

(1) Lights and reflectors. The lights and reflectors are checked for proper operation and state of repair. Check for burned out bulbs and missing, cracked or broken lens.

(2) Safety devices. Once more check the safety devices such as the:

(a) Horn
(b) Windshield wiper and washer
(c) Parking brake
(d) Fire extinguisher
(e) Troop safety strap

(3) Brakes. The brakes will be checked a final time to ensure they are working properly.

(4) Fuel, oil and water. The fuel, oil and water will be replenished to the "full" levels to ensure readiness for the next trip. Procedures for this were covered earlier in the class.

(5) Locking and fastening devices. Check door latches for proper operation. Check all canvas fastening straps and rear canvas zipper for serviceability.

(6) Cooling fan. Inspect the cooling fan blade assembly for security, cracks and/or damage. If there is any evidence of cracks or damage the vehicle should not be used again until the defects are repaired.

(7) Fuel filter. The fuel filter drain cock is located on the left side of the engine compartment under the windshield washer reservoir.

(a) Start the engine and place a container under the drain cock to catch the draining fluid.
(b) Open the drain cock and drain approximately one pint of fuel or until fuel runs clear.
(c) Close the drain cock and check for fuel leaks.
(d) If contaminated fuel continues to be evident, notify organizational maintenance.

(8) As instructed earlier, "Weekly" as well as "Daily" PMCS would be accomplished if you are the assigned operator but have not operated the vehicle since the last "Weekly" PMCS or if operating the vehicle for the first time. The following items would be included in the PMCS:

(a) Drive belts
(b) Battery level
(c) Antifreeze
(d) Tires
(e) Cleaning the vehicle
(f) The procedures for performing these PMCS functions will be explained in an upcoming class on "Weekly" PMCS.
(g) Notice the "Before", "During" and "After Operation" PMCS listed in the PMCS table in the operator's manual do not correspond to what is listed in the PMCS on the bottom of the trip ticket. You will still perform all the PMCS as stated in the operator's manual and on the trip ticket and use the bottom portion of the trip ticket and the preventive maintenance checklist to annotate the results of this PMCS.

STUDENT REFERENCES:
FM 21-305
TM 2320-10/6B
NAVMC 10627